

We claim:

1. A system for determining the identity of a pattern on an area, comprising:

- a. a light source having a predetermined spectral bandwidth for producing a collimated beam of light,
- b. a beam splitter for splitting said collimated beam of light into a plurality of beams,
- c. a modulating frequency source for modulating the frequency of one of said plurality of beams,
- d. a frequency shifter for shifting the frequency of said modulating frequency,
- e. a plurality of acousto-optic modulators for modulating the intensities of said respective plurality of beams,
- f. a plurality of polarizers for polarizing said respective plurality of beams,
- g. a directional coupler for reflecting, and redirecting the reflection of said one of said beams,
- h. a beam scanner for causing one of said beams to scan across said area,
- i. an optical processor for processing the combined energies of said plurality of beams,
- j. an electronic processor for processing data from said optical processor,
- k. a data processor for processing data from said electronic processor,
- l. said data processor containing a pattern recognition algorithm for comparing previously-stored data with data from said electronic processor,
- m. said pattern recognition algorithm also arranged to provide an indication of the identity of said pattern based on comparing said previously-stored data with said data from said electronic processor.

2. The system of claim 1 wherein said light source is a light-emitting diode.

3. The system of claim 1 wherein said light source is a bandpass-filtered, incandescent lamp.

4. The system of claim 1 wherein said modulating frequency source is arranged to modulate a first of said acousto-optic modulators at a first frequency.

5. The system of claim 1 wherein said modulating frequency shifter is arranged to shift the frequency from said modulating frequency source and apply said shifted frequency to a second of said acousto-optic modulators.

6. The system of claim 1 wherein a first of said polarizers is arranged to polarize light from the first of said acousto-optic modulators, and a second of said polarizers is arranged to polarize light from the second of said acousto-optic modulators.

7. The system of claim 1 wherein said first polarizer is positioned to cause light from itself to enter said beam scanner.

8. The system of claim 1 wherein said directional coupler is positioned to cause light from itself to enter said beam scanner.

9. The system of claim 1 wherein said second polarizer is positioned to cause light from itself to enter said optical processor.

10. The system of claim 1 wherein said optical processor is arranged to combine said first and second beams of light into a combined beam and detect the characteristics of said combined beam.

11. The system of claim 1 wherein said electronic processor is arranged to further refine the signal from said optical processor into amplitude and positional information.

12. The system of claim 1 wherein said data processor is arranged to utilize said analog and positional information from said electronic

~~processor to produce a binary value of said signal corresponding to said positional information.~~

13. The system of claim 1 wherein said data processor is arranged to provide data to said pattern recognition algorithm and said pattern recognition algorithm is arranged to compare said data with known data for identifying an individual.
14. The system of claim 1 wherein said area is a fingernail of an individual, whereby said system can recognize the identity of said individual.
15. A method for determining the identity of a pattern on an area, comprising:
 - a. scanning said area with a scanning beam of light having a predetermined spectral bandwidth to provide a reflected beam,
 - b. providing a reference beam of light having a predetermined bandwidth,
 - c. providing an analysis system containing previously stored pattern recognition data,
 - d. analyzing the sum of light in said reflected beam and light in said reference beam to provide an analysis,
 - e. providing said analysis to a pattern recognition algorithm,
 - f. using said algorithm to compare the results of said analysis with said previously stored pattern recognition data, so as to provide a comparison, and
 - g. using said comparison to identify said pattern.
16. The method of claim 15 wherein said area is a fingernail of an individual, whereby said method can recognize the identity of said individual.
17. The method of claim 15 wherein said area is a toenail of an individual, whereby said method can recognize the identity of said individual.
18. The method of claim 15 wherein said comparison provides a positive or negative identification of said pattern.

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19. The method of claim 15 wherein said comparison provides an identification of said pattern along with a confidence level.

20. A system for determining the identity of an individual, comprising:

- a. means for scanning a beam of polarized light within the nail bed of an individual to provide a reflected beam,
- b. means for analyzing said reflected beam,
- c. means for comparing of the results of said analysis with previously stored data to provide a comparison, and
- d. means for providing a positive or negative identification of said individual based upon said comparison.

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